

What is claimed is:

1. An isolated polynucleotide encoding a carboxylesterase capable of metabolizing a chemotherapeutic prodrug and inactive metabolites thereof to active drug.
- 5 2. The isolated polynucleotide of claim 1 comprising of a cDNA of SEQ ID NO:20 or SEQ ID NO:27.
3. The isolated polynucleotide of claim 1 comprising of a cDNA encoding a carboxylesterase of SEQ ID NO:26 or SEQ ID NO:28.
- 10 4. An isolated polynucleotide capable of hybridizing with a polynucleotide of claim 1.
5. A vector comprising the polynucleotide of claim 1.
6. A host cell comprising the vector of claim 5.
7. A polypeptide encoded by the polynucleotide of
15 claim 1.
8. A composition comprising the polynucleotide of claim 1 and a disease-specific responsive promoter.
9. The composition of claim 8 wherein said disease-
20 specific responsive promoter is a *myc* promoter.
10. The composition of claim 9 wherein the *myc* promoter is ODC.
11. The composition of claim 9 wherein the *myc* promoter is R6ODC.

12. A method for sensitizing tumor cells to a chemotherapeutic prodrug comprising transfecting selected tumor cells with the composition of claim 8.

13. A method of inhibiting tumor cell growth comprising:

(a) sensitizing tumor cells in accordance with the method of claim 12; and

(b) contacting said sensitized tumor cells with a chemotherapeutic prodrug so that tumor cell growth is inhibited.

14. The method of claim 13 wherein the chemotherapeutic prodrug is selected from a group consisting of CPT-11 and APC.

15. A method of inhibiting tumor recurrence in a patient comprising:

(a) surgically removing a tumor from a patient;

(b) administering the composition of claim 8 at the site of tumor resection; and

(c) administering a chemotherapeutic prodrug systemically so that tumor recurrence is inhibited.

16. The method of claim 15 wherein the chemotherapeutic prodrug is selected from a group consisting of CPT-11 and APC.

17. A method of purging bone marrow cells of tumor cells comprising:

(a) removing bone marrow cells from a patient; and

(b) contacting the bone marrow cells with the composition of claim 8 and a chemotherapeutic prodrug.

18. A method of inhibiting tumor growth in a patient comprising administering to a patient a composition of claim 8 and APC.

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C1
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C2

19. A drug screening assay for identifying drugs that are activated by a carboxylesterase enzyme comprising:

(a) transfecting cells in culture with the polynucleotide of claim 1;

5 (b) contacting said cells with a candidate drug; and

(c) determining growth or survival of said cells in the presence of the candidate drug.

20. A drug screening assay for identifying compounds containing a COOC ester linkage that are activated by a
10 carboxylesterase enzyme comprising:

(a) adding a known concentration of a test compound containing a COOC ester linkage to an assay tube containing a biological buffer and a polypeptide of claim 7;

(b) incubating the assay tubes; and

15 (c) analyzing contents of the assay tube for cleavage fragments of the test compound at the COOC ester linkage wherein the presence of the cleavage fragment is indicative of activation of the compound by the carboxylesterase enzyme.

21. A modified ornithine decarboxylase promoter
20 comprising additional CACGTG E box sequences which upregulates target protein expression in tumor cells that over-express myc proteins.

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